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Study of factors affecting the erosive wear of equipment for dehydrogenation units in fluidized beds of microspherical chromia-alumina catalysts under industrial operating conditions

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Abstract

© Pleiades Publishing, Ltd., 2014. © A.N. Kataev, A.A. Lamberov, S.R. Egorova, Kh.Kh. Gilmanov, 2014. The main problems associated with the operation of microspherical treating-type chromia-alumina catalysts with increased strength during isoparaffin dehydrogenation are discussed. The erosive wear of the walls of overflow pipelines when using a mixture of treating-type KDI and conventional IM-2201S catalysts and ways of solving the problem are emphasized. It is found that the main reason for an increase in erosive wear is the greater momentum of catalyst particles due to a higher mean particle size and gas transport rate; upon transitioning from IM-2201S to a mixture of IM-2201S and KDM (70 : 30), the mean particle size of the equilibrium catalyst grows from 68 to 74 μm. The optimum size range of a high-strength catalytic system in which the activity does not increase over time is calculated with a lower rate of transport gas injection while keeping the number of particles 20-40 μm in size at 20-30 wt %. Pilot batch production of high-strength catalyst in the optimum size range is recommended in order to shift units for the industrial dehydrogenation of isobutane to the use of treating-type KDI catalyst without the addition of IM-2201S.

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Keywords

Abrasive activity, Abrasivity, Chromia-alumina catalyst, Dehydrogenation, Erosive wear